

Name \_\_\_\_\_

## Precalculus: Semester 1 Pretest

Please answer all questions on this test to the best of your ability. Your effort will improve the quality of the data and is greatly appreciated! Some of the items on this test are multiple choice and some are short answer. In either case, please make sure you place your final answer on the provided answer line next to the question.

1. Model the following situation with a linear equation: The gas tank in a truck holds 15 gallons. The truck uses  $\frac{4}{7}$  gallon per mile. Write an equation that gives the number of gallons left in the tank after driving  $x$  miles. (A-CED-2)

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2. Find the slope-intercept form of the equation of the line through the point  $(3,5)$ , perpendicular to the line with the equation  $y = 2x + \frac{4}{3}$ . (G-GPE-5)

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3. For the function  $g$  given by  $g(x) = 9x^2 - \sqrt{3x}$ , find  $g(5)$ . Leave your answer in root form, not as a decimal. (F-IF-2)

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4. Find the domain of the function  $f$  given by  $f(x) = \frac{8x}{x(x^2 - 49)}$  (F-IF-5)

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5. For the function  $f$  given by  $f(x) = x^2 + 2$ , give the domain and the range. (F-IF-5)

Domain: \_\_\_\_\_

Range: \_\_\_\_\_

6. Use your calculator or graphing device to find the relative maximum for the function  $g$  given by  $g(x) = x^3 + 9x^2 + 24x + 12$ . (F-IF-4)

Maximum: \_\_\_\_\_

7. Describe the transformation that occurs in the function  $f$  given by  $f(x) = (x + 7)^2 - 3$  (F-BF-3)

- a. Horizontal shift of 7 units to the right and a vertical shift of 3 units downward.
- b. Horizontal shift of 7 units to the left and vertical shift of 3 units downward.
- c. Horizontal shift of 7 units to the left and vertical shift of 3 units upward.
- d. Horizontal shift of 7 units to the right and vertical shift of 3 units upward.

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8. For the functions  $f$  given by  $f(x) = x^2 + 2x + 5$  and  $g$  given by  $g(x) = -1 - 2x$ , find  $(f + g)(x)$ . (A-APR-1)

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9. For the functions  $f$  given by  $f(x) = x^2 + 2x + 5$  and  $g$  given by  $g(x) = -1 - 2x$ , find  $(f \circ g)(x)$ . (F-BF-1c)

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10. Find the inverse of the function  $y = 4x + 1$  (F-BF-4a)

- a.  $y = -4x - 1$       b.  $y = \frac{1}{4}x - 1$       c.  $y = 4x + 1$       d.  $y = \frac{1}{4}x - \frac{1}{4}$

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11. Find all real zeros of the function  $f$  given by  $f(x) = 9x^4 - 144x^2$  by factoring. (Take out the common factor first.) (A-APR-3)

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12. Find all zeros of the function  $f$  given by  $f(x) = 2x^3 + 5x^2 - x - 6$ , given that  $x = -2$  is one of the zeros. (A-APR-3)

13. Simplify completely:  $(3 + 8i)(2 - 3i)$  (N-CN-2)

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a.  $6 - 24i$

b.  $15 + 7i$

c.  $6 + 5i$

d.  $5 + 5i$

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14. Divide  $\frac{8 + i}{5 + 6i}$  and rewrite in standard  $(a + bi)$  form. (N-CN-3)

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15. Solve the function  $f$  given by  $f(x) = 2x^2 - 5x - 1$ . Keep the solution in root form, not as a decimal. (A-REI-4b)

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16. Find the zero(s) of the function  $h$  given by  $h(x) = x^3 + x^2 + 5$  using a graphing utility. (A-REI-11)

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17. Find the horizontal asymptotes, if any, of the graph of the function  $f$  given by  $\frac{2x^2 + 5}{2x^2 + 2x - 2}$ .  
(F-IF-7d)

- a.  $y = 1$       b.  $y = \frac{-5}{2}$       c.  $y = 0$       d. No horizontal asymptotes

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18. Find the exponential form of the logarithmic equation  $\log_{16} 8 = \frac{3}{4}$ . (F-BF-5)

- a.  $\left(\frac{3}{4}\right)^8 = 16$       b.  $\left(\frac{3}{4}\right)^{16} = 8$       c.  $8^{3/4} = 16$       d.  $16^{3/4} = 8$       e. None of these

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19. Solve for  $x$ :  $5e^{x-2} = 12$  (F-BF-5)

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20. Evaluate  $\log_4 7$  using the change of base formula. (F-LE-4)

- a. 1.403      b. 1.75      c. 0.712      d. 0.845

21. Write as the logarithm of a single quantity  $\frac{1}{4}\log_b 16 - 2\log_b 5 + \log_b 7$ . (A-SSE-2)

a.  $\frac{14}{25}$

b.  $\log_b \frac{2}{175}$

c. 1

d.  $\log_b \frac{14}{25}$

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22. Solve for x:  $16 = 2^{7x-5}$  (F-LE-4)

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23. Solve for x:  $\log x + \log(x+3) = 1$  (F-BF-5)

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24. Evaluate  $\sec \frac{\pi}{3}$  using your unit circle. (F-TF-3)

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25. A 12 foot ladder makes an angle of  $47^\circ$  with the ground as it leans against a house. How far up the house does the ladder reach? (G-SRT-8)

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26. What is the period of  $y = \sin(2x)$ ? What does the period tell you about the graph? (F-TF-5)

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27. If  $\theta$  is an acute angle ( $\theta$  is in quadrant I) and  $\csc \theta = \frac{13}{12}$ , find  $\cot \theta$ . (G-SRT-8)

a.  $\frac{12}{5}$

b. 25

c.  $\frac{5}{12}$

d. 5

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28. Use the data in the table to find a quadratic model that best fits the data. (S-ID-1a)

Speed, $s$	Miles per Gallon, $M$
30	18
35	20
40	23
40	25
45	25
50	28
55	30
60	29
65	26
65	25
70	25

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